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IS 13775-1 (1993): Conveyor belting - Solid woven cotton/synthetic impregnated and unimpregnated, Part 1: Aeroslide belting for air gravity conveyor [PGD 31: Bolts, Nuts and Fasteners Accessories]

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भाग 1 वातगुरूत्वा वाहक के लिये एरोस्लाइड पट्टे

Indian Standard

CONVEYOR BELTING — SOLID WOVEN COTTON/SYNTHETIC IMPREGNATED AND UNIMPREGNATED — SPECIFICATION

PART 1 AEROSLIDE BELTING FOR AIR GRAVITY CONVEYOR

UDC 621·867·2-419·8

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NEW DELHI 110002

June 1993 **Price Group 3**

Pulleys and Belts Sectional Committee, LM 09

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Pulleys and Belts Sectional Committee had been approved by the Light Mechanical Engineering Division Council.

There are four basic parts to an aeroslide belt conveyor system:

1) Product — Fine to medium particle size particle material cement, fly ash, aluminia, bauxite, etc
2) Aeroslide Belting — Semi-permeable, allows air to pass through, but not product
3) Lower Air Chamber — Area below membrane which is the source of air
4) Upper Air Chamber — Area above membrane which receives and exhausts the air and contains the conveyed product

Air in a controlled manner is passed through the aeroslide belting and this 'aerates' the dry materials in the upper chamber and 'fluidises' this mass, which loses its character of a 'solid' and assumes, that of a 'liquid' and hence even on a slight gradient 'flows' like a 'liquid'.

Aeroslides belts are generally used in cement industry for conveying clinkers, finished cements etc.

Annex A gives the information to be supplied by the purchaser with enquiry or order.

This Indian Standard has been prepared in the light of manufacturing practices prevailing in the country.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CONVEYOR BELTING — SOLID WOVEN COTTON/SYNTHETIC IMPREGNATED AND UNIMPREGNATED — SPECIFICATION

PART 1 AEROSLIDE BELTING FOR AIR GRAVITY CONVEYOR

1 SCOPE

1.1 This Indian Standard (Part 1) covers requirement of aeroslide beltings to be used in Aerated Troughed Conveyors including classification of its air permeability intended to be used in conveying of cement raw meal, finished cement, clinker etc. Though this specification has been primarily prepared for the cement industry it does not preclude its use in any other similar applications.

2 TERMINOLOGY

For the purpose of this standard the following terminology shall apply.

2.1 Width of Aeroslide Belting

The smallest dimension in the plane of the sheet of aeroslide belting.

2.2 Pressure Drop

The difference between the pressure on the upstream and downstream surface of the porous material (aeroslide belting).

2.3 Permeability Characteristics

The permeability characteristic or flow rate/pressure drop characteristic used in this specification is described as follows:

> A volume flow rate per unit of area is equivalent to velocity.
>
> The velocity with which air will permeate through an aeroslide belting depends upon the difference in pressure across the aeroslide belting, and this difference is called the pressure drop.
>
> When inertia losses are absent (i.e. at a low velocity) the velocity is proportional to the pressure drop and the permeation is said to be in the viscous flow regime.

2.3.1 For the puspose of this specification, aeroslide belting are classified according to their flow rate/pressure drop, characteristics under viscous flow conditions.

3 CONSTRUCTION

3.1 The belting shall normally be of solid woven textile construction.

3.2 The belting shall be woven in a minimum of two plies (thickness shall be not less than 4 mm). The minimum thickness requirement can be met by a two-ply solid woven belting.

3.3 The belting shall be woven with preferably polyester filament yarn. However, for low temperature requirements the belt may be woven with cotton yarn and for higher temperature requirements the belt may be woven with yarns.

4 DIMENSIONS AND TOLERANCES

4.1 Length

4.1.1 The length of belting shall be specified by the purchaser which shall be supplied with a tolerance on length of $^{+5}_{-0}$ percent.

4.2 Width

4.2.1 Width shall be as agreed between the purchaser and the supplier subject to the following tolerances:

	Tolerance
a) For widths up to and including 500 mm	±5 mm
b) For widths over 500 mm	±1% of belt width

4.3 Belt Thickness and Weight

4.3.1 Thickness and weight of aeroslide belting shall be as given in Table 1.

5 TEST REQUIREMENT OF FINISHED BELTING

5.1 Tensile Strength

5.1.1 Full thickness tensile and transverse tensile strength of the finished belting when determined in accordance with the method of test described in Annex B shall be not less than the values given in Table 1.

Table 1 Full Thickness Tensile Strength and Weight

(*Clauses* 4.3.1, 5.1.1, 5.2.1 *and* 6.1)

Belt Type	Thickness mm Tol ±0·5 mm	Minimum Tensile Strength in kN/25 mm Width		Weight kg/m^2
		Longitudinal Direction	Transverse Direction	
P 40	4·0	11·25	6·5	3·6
P 45	4·5	12·50	7·5	3·8
P 48	4·8	15·75	10·0	3·8
C 65	6·5	7·25	3·25	5·0

NOTE — Minimum of two plies in solid woven construction is required.

5.2 Temperatnre Resistance

5.2.1 After exposing the test sample at a temperature of 180°± 2°C for 4 hours according to procedure given in Annex C, the tensile test is carried out. The drop in tensile strength as measured in accordance with Annex B shall not be less than 80 percent of value specified in Table 1.

NOTE — For cotton material, test samples may be kept at a temperature of 100±2°C for 4 hours.

5.3 Air Permeability

5.3.1 The air permeability of aeroslide belting when tested as per method described in Annex D shall be as per Table 2 with a tolerance of ±20%.

6 DESIGNATION

6.1 The belting complying with the requirements of this standard shall be designated according to the type mentioned in Table 1.

7 MARKING

7.1 The belting package shall be marked indelibly and legibly with the following:

a) Indication of the source of manufacture;

b) Type of belting;

c) Length, width and thickness of belting;

d) Year of manufacture; and

e) Number of this standard.

Table 2 Typical Air Permeability Values

(*Clause* 5.3.1)

Pressure Drop (Millimetre of Water)	Flow Rate (NM^3/M^2/Sec)
90	0·025 0
100	0·027 8
200	0·027 8
200	0·025 0
200	0·033 3
200	0·050 0
200	0·062 5
250	0·066 7
250	0·041 7
300	0·033 3
300	0·041 7
300	0·097 2
300	0·111 2
400	0·055 5
500	0·069 5
600	0·083 3
800	0·111 2

NOTES

1 However, this does not preclude the use of other air permeability values suited to a particular installation.

2 The air permeability value for aeroslide belting made of cotton shall be as agreed between the manufacturer and the purchaser.

7.2 Standard Marking

Details available with the Bureau of Indian Standards.

8 PACKING

8.1 The belting shall be wrapped by polythene and then packed with hessian cloth.

ANNEX A

(*Foreword*)

INFORMATION TO BE SUPPLIED BY THE PURCHASER WITH ENQUIRY OR ORDER

1) Type of belting
2) Belt width, thickness and length required
3) Required temperature resistance
4) Tensile strength (longitudinal and transverse)
5) Details of existing belt, if any.

ANNEX B

(*Clauses* 5.1.1 *and* 5.2.1)

METHOD OF TEST FOR TENSILE STRENGTH

B-1 PRINCIPLE

The tensile strength shall be measured on sample of aeroslide belting using dumb-bell shaped test pieces.

The test pieces shall be held in the grip of a suitable tensile testing machine. The grips shall be separated at a defined rate and the maximum load observed before the test piece breaks shall be recorded as the tensile strength of that test piece.

B-2 APPARATUS

A tensile testing machine complying with the following requirements shall be used.

B-2.1 The accuracy of the machine shall be within 1·0 percent.

B-2.2 The range of the machine shall be chosen so that the forces to be measured come within 80% of the full scale deflection.

B-2.3 For the tensile strength test, the machine shall have either an autographic force recorder or a maximum force indicator.

B-2.4 The force shall be applied smoothly without any jerking or intermittent action and the power shall be sufficient to stress the test piece to the point of fracture at a rate of travel of 100 ± 5 mm per minute for the tensile strength test.

B-2.5 The jaws of the machine shall hold the test piece without slip and without damage.

NOTES

1 An example of a suitable grip is shown in Fig. 1.

2 The serrations of the grips shall be suitable to give adequate grip to the belt without causing damage to the belt.

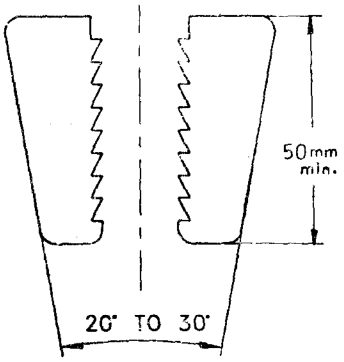


FIG. 1 SINGLE COMPARTMENT GRIPS

B-3 TEST PIECE SHAPE AND DIMENSIONS

The shape/dimensions of test pieces shall conform to Type A or Type B shown in Fig. 2. The test pieces shall be representative of the condition and thickness of the main body of the belt.

B-4 PREPARATION OF TEST PIECES

B-4.1 Cut two pieces in the longitudinal direction parallel to the length of the belt and two pieces in the transverse direction at right angles to the length of the belt.

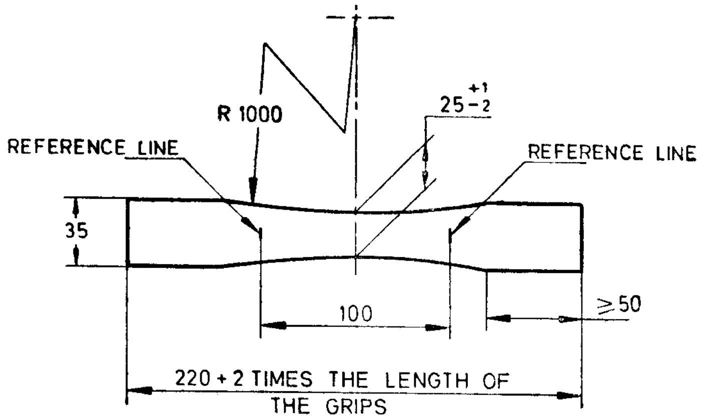
NOTE — No test piece shall be cut from the sample with its longitudinal edge less than 12 mm from and edge of the sample.

B-4.2 Condition the test pieces in a standard atmosphere of 65 ± 5 percent relative humidity and 37 ± 2°C temperature for three days and then test the samples for tensile strength.

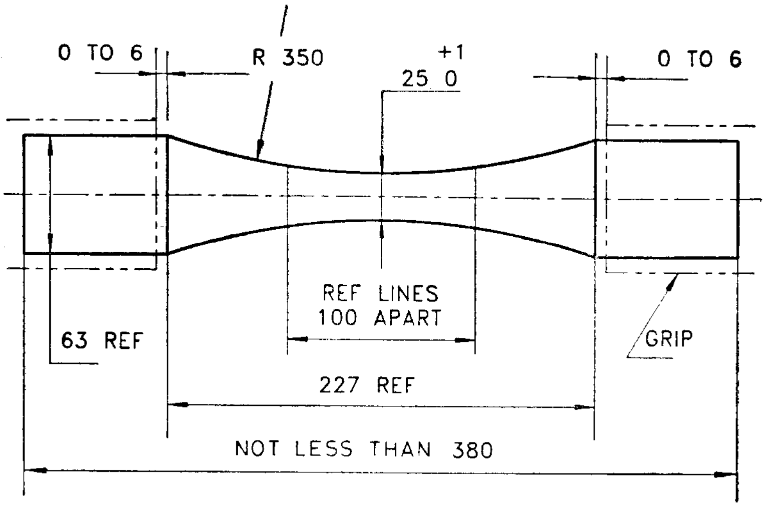
B-5 PROCEDURE

B-5.1 Place the end of the test piece symmetrically in the grips of the tensile testing machine and separate the grips at a constant rate of travel at a speed of 100 ± 5 mm/min until the test piece breaks. Record the maximum breaking strength.

B-5.2 The breaking strength as recorded of each of the four test pieces shall be reported separately, the average value for each of the two sets of two tests on the test pieces cut longitudinally and transversely from the belt shall be calculated and reported.



TYPE A



TYPE B

All dimensions in millimetres.

FIG. 2 TYPES OF TENSILE TEST PIECES

ANNEX C

(*Clause* 5.2.1)

METHOD OF TEST FOR TEMPERATURE RESISTANCE

C-1 PRINCIPLE

The temperature resistance is determined by measuring the tensile strength after exposing the test pieces at higher temperature.

C-2 APPARATUS

A static oven complying with the following requirements shall be used.

C-2.1 The accuracy of the oven shall be within 1·0 percent.

C-2.2 The range of the static oven shall be chosen so that the temperature to be measured come within 80% of the scale of temperature indication.

C-3 PREPARATION OF TEST PIECES

C-3.1 Cut two test pieces of 300 mm square for the test.

C-4 PROCEDURE

C-4.1 Place the test pieces in the static oven and expose to temperature of 180 ± 2°C for 4 hours and then test the samples for tensile strength. If any test piece is found to result in lower tensile strength as stated in **5.2.1** another test piece may be exposed and tested. If this sample also fails the belts would be rejected.

ANNEX D

(*Clause* 5.3.1)

METHOD OF TEST FOR AIR PERMEABILITY

D-1 PRINCIPLE

The air permeability is measured by blowing air from below at a given pressure drop on a sample of aeroslide belting.

D-2 APPARATUS

The general arrangement of an air permeability machine is shown in Fig. 3.

D-2.1 Test Head

The dimensions of the test head to be used must be related to the dimensions of the material to be tested, in order that the measurement of the variation in permeability shall be correctly assessed by ensuring that there are at least two non-overlapping test areas across the width of the specimen.

D-2.2 Width of the Guard Ring Test Head

The sum of the test head diameter and the mean diameter of the inner seals shall be less than the width of the aeroslide belting. Also the guard ring width shall not be less than the thickness of the aeroslide belting.

D-2.3 The machine is connected to a differential pressure drop meter at the bottom and a flow meter on the top to record the pressure drop and flow rate.

D-3 PREPARATION OF TEST PIECES

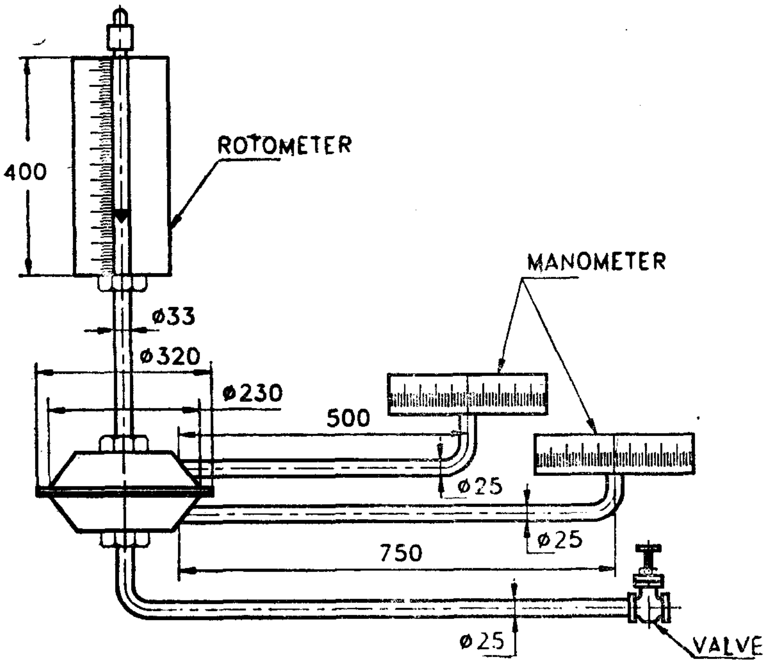
D-3.1 Cut two test pieces of 300 mm in length from the full width of the aeroslide belting for air permeability test.

D-4 PROCEDURE

D-4.1 Place this test piece in the test head and blow air from below. The supplier has the choice of either determining the flow rate at a fixed pressure drop, or determining the pressure drop at a fixed flow rate or observing both the flow rate and the pressure drop.

D-5 EXPRESSION OF RESULTS

The air permeability characteristics used is defined as the air flow per unit pressure drop for viscous flow conditions.



All dimensions in millimetres.

FIG. 3 AIR PERMEABILITY MACHINE

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PART 1 AEROSLIDE BELTING FOR AIR GRAVITY CONVEYOR

(*Page* 3, *clause* **B-4.2**, *third line*) — Substitute '27 ± 2°C' *for* '37 ± 2°C'.

(LM 09)

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